



## A new species of *Crenicichla* (Perciformes: Cichlidae) from the Ventuari River, Upper Orinoco River Basin, Amazonas State, Venezuela

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### Abstract

We describe a new species of the genus *Crenicichla* Heckel, 1840, from the Ventuari River, a tributary of the Orinoco River in southern Venezuela. *Crenicichla zebrina* is distinguished from all other species in the genus by its unique coloration pattern, including the combination of a large, dark, vertically oriented, more or less oval-shaped humeral spot, and thin, dark bars, separated by narrow, vertical, yellowish bars extending between the dorsal and anal fin base on the caudal half of the body. *Crenicichla zebrina* is included in the putative *C. acutirostris* group (9 species) and represents the only species in the group known to date from the Orinoco basin.

**Key words:** *Crenicichla*, new species, Orinoco, Ventuari River, Venezuela

### Resumen

Se describe una especie nueva de *Crenicichla* Heckel, 1840, del Río Ventuari, un tributario del Río Orinoco al sureste de Venezuela. *Crenicichla zebrina* se distingue de todas las demás especies en el género por un patrón único de coloración que consiste de barras verticales oscuras separadas por finas barras de color amarillento que se extienden desde la aleta dorsal hasta la base de la aleta anal; en combinación con una mancha humeral vertical, grande y oscura, más o menos ovalada. *Crenicichla zebrina* pertenece al grupo putativo *C. acutirostris* (9 especies) y representa la única especie del grupo conocida hasta hoy en la cuenca del Orinoco.

**Palabras claves:** *Crenicichla*, especie nueva, Río Orinoco, Río Ventuari, Venezuela

### Introduction

The predatory genus *Crenicichla* Heckel, 1840 (pike cichlids) is the most diverse genus of South American cichlids next to *Apistogramma*, comprising 78 valid species in cis-Andean South America (Kullander 2003; Kullander & Lucena 2006; Lucena 2007). Previously thought to be a basal Neotropical genus related to *Cichla* (Stiassny 1987, 1991; Kullander 1998), *Crenicichla* has recently been found to be related to *Apistogramma* and *Satanoperca* within the South American clade Geophaginae (Farias *et al.* 2000; López-Fernández *et al.* 2005a, b). The monophyly of *Crenicichla* has not been completely established, as some molecular evidence fails to separate it from the closely allied genus *Teleocichla* (Farias *et al.* 2000; HLF *et al.* Unpubl.).

Although no species-level phylogenetic analysis has been performed, the species of *Crenicichla* are often divided into two major groups based on scale counts (Kullander 1991); the large-scaled species with E1 scale counts of 70 or less, and the small-scaled species with E1 scale counts of 80 or more. Within the latter, Kullander (1991) distinguished the *acutirostris* group to include species with dorsoventrally compressed bodies, very pointed snouts and generally more than 80 E1 scales. This group includes *C. acutirostris* Günther, 1862 (E1 scales 103–111), *C. jegui* Ploeg, 1986 (E1 scales 76–82), *C. multispinosa* Pellegrin, 1903 (E1 scales 89–97), *C. percna* Kullander, 1991 (E1 scales 95–104), *C. phaiospilus* Kullander, 1991 (E1 scales 94–110), *C. ternetzi* Norman, 1926 (E1 scales 80–91), *C. tigrina* Ploeg, Jégu & Ferreira, 1991 (E1 scales 105–132) and *C. vittata* (E1 scales 80–90). Phylogenetic analysis is pending to determine whether the *acutirostris* group represents a monophyletic assemblage within *Crenicichla*.

*Crenicichla* is present in all major cis-Andean drainages of South America, from the coastal drainages of Venezuela (excluding the Maracaibo Lake) and the Guianas to the lower Paraná and Plata rivers in Uruguay and Argentina (Kullander 2003). Eleven species of *Crenicichla* are currently recognized from the Orinoco River basin in Venezuela and Colombia, (Lasso *et al.* 2004); however, we estimate that at least six new species remain to be described from this river drainage. Interestingly, the Orinoco basin is the only major drainage of South America where the *acutirostris* species group is not known. After intensive sampling of the Ventuari River drainage in the northwestern edge of the Guyana Shield in Venezuela, the senior author (CGM) was able to collect two specimens of a rare, unidentified species of *Crenicichla*. In this paper, we describe those two specimens as a new species, which also constitutes the only known representative of the *acutirostris* species group in the Orinoco basin.

## Material and methods

All measurements were taken using dial calipers to the nearest 0.1 mm. Counts of fin rays and scales were made using transmitted light on a dissecting microscope. Counts and measurements follow Kullander (1986) and Kullander and Nijssen (1989). The principal scale count, E1 scales, includes scales in the row immediately above that including the lower lateral line. Vertebral counts were made from x-rays. Institutional abbreviations follow Leviton *et al.* (1985).

### *Crenicichla zebrina* n. sp. (Figs. 1–3)

**Holotype:** MCNG 45975, 189.0 mm SL; Venezuela: Amazonas, Orinoco River drainage, lower Ventuari River in front of Cucurital fishing camp, 04°07'03", 66°40'47", C.G. Montaña, 26 June 2002.

**Paratype:** ROM 82529 (ex MCNG 45803) 1 ex., 264.0 mm SL; Venezuela: Amazonas, Orinoco River drainage, lower Ventuari River, at 100 of the mouth of Caño Kanaripo, 04°04'58", 66°50'54", C.G. Montaña, 9 Mar 2002.

**Diagnosis.** *Crenicichla zebrina* is distinguished from all congeners by its pigmentation pattern, which includes the unique combination of a large, more or less oval-shaped humeral spot, and thin, dark vertical bars on the caudal half of the body which are separated by thinner yellowish vertical bars. It further differs from all other species in the *C. acutirostris* group except *C. tigrina* by a higher lateral scale count (E1=114 versus 111 or less). It can be distinguished from *C. tigrina*, by the presence of a large, non-ocellated humeral spot (versus no spot), lower dorsal spine counts (XXII versus XXIII–XXIV), and the presence of alternating light and dark colored bars restricted to approximately the caudal half of the body (vs. bars on all the body in *C. tigrina*).

**Description.** *Crenicichla zebrina* (Fig. 1) is described from two specimens collected in the lower Ventuari River, a tributary of the Orinoco River, Amazonas State, Venezuela. All measurements based on the holotype (189.0 mm SL) and the paratype (264.0 mm SL). Measurements are given in Table 1.

**TABLE 1.** Morphometrics of *Crenicichla zebrina*.

Measurements	Holotype MCNG-45975	Paratype ROM-82529
SL mm	189.0	264.0
Body depth	33.8	51.0
Head length	54.0	83.7
Caudal-peduncle length	28.9	35.7
Caudal-peduncle depth	19.5	28.8
Pectoral-fin length	30.4	42.5
Pelvic-fin length	27.0	42.5
Last dorsal-fin spine length	15.9	27.0
Snout length	19.6	28.4
Head width	21.7	30.4
Orbital diameter	10.0	12.9
Interorbital width	10.0	17.0
Preorbital depth	5.5	9.3
Upper jaw length	18.3	29.5
Lower jaw length	26.1	40.7

Shape. Body elongate, body depth 17.8–19.3% SL. Head deeper than wide. Caudal peduncle length 1.2 to 1.5 times in depth. Snout long, rounded in dorsal view, pointed in lateral view. Lower jaw slightly prognathous, its articulation anterior to the margin of orbit, ascending premaxillary process reaching vertical line through middle of orbit. Maxilla reaching to vertical line through anterior margin of orbit. Lips moderately wide, lower lip folds separated anteriorly at symphysis; folds of upper lip not continuous but interrupted at the wide symphyseal region; postlabial skin fold margin slightly concave. Orbit supralateral, rising slightly above frontal contour, not visible from ventral view, chiefly in the anterior half of the head. Nostrils dorsolaterally placed, approximately on anterior third of distance between orbit and margin of postlabial skin fold, with low tubular margin but no anterior marginal skin flap. Preopercle without serrations.

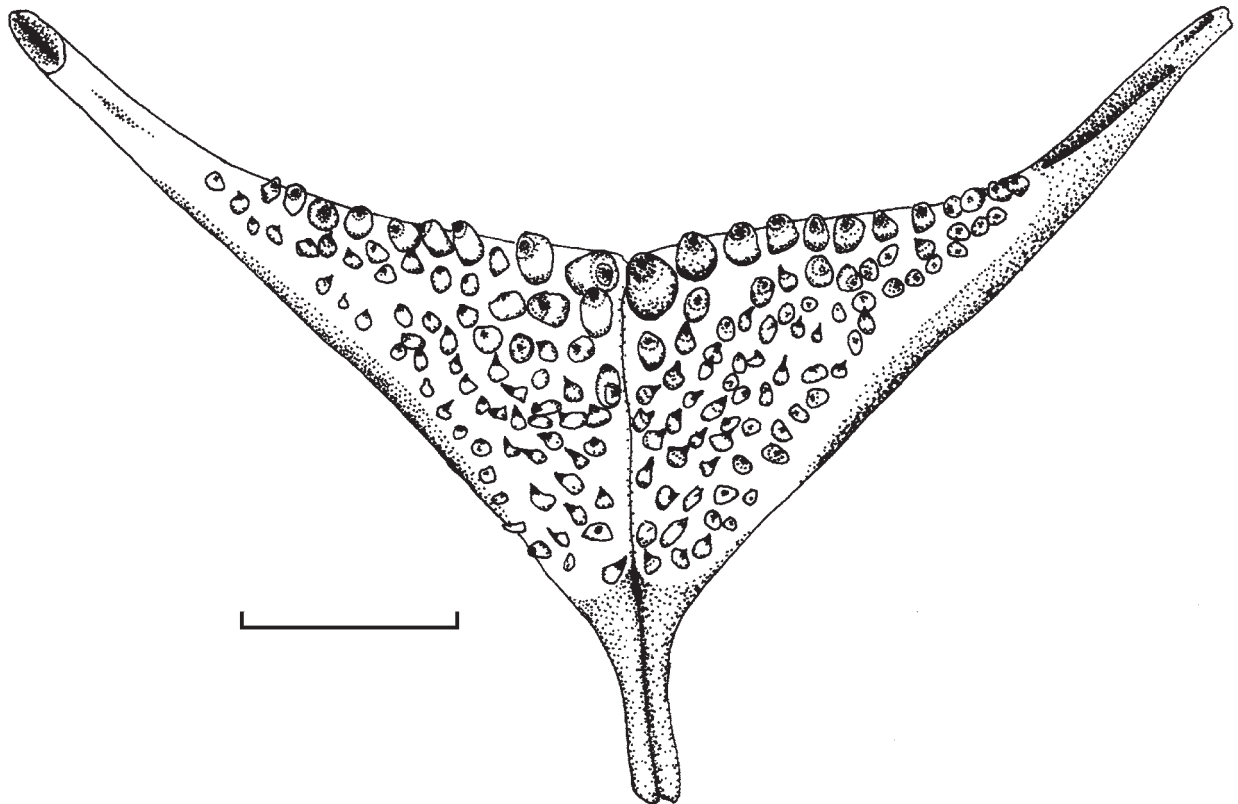
Scales. E1 114 (2), scales between upper lateral line and dorsal-fin base 17–18 anteriorly, 9–11 posteriorly; 6 scale rows between lateral lines. Scales on upper lateral line 25–26 and lower lateral line 14–15. Anterior upper lateral-line scales slightly larger and more elongate than adjacent scales. Flank scales ctenoid. Cycloid scales on head, anteriorly on back, along dorsal fin base, chest, and on belly below line from lower edge of pectoral fin base to anal fin origin and near fin base. Predorsal and prepelvic scales small, superficially embedded in skin. Cheek fully scaled; 6 scale rows below eye embedded in skin. Interopercle naked. Circumpeduncular scale rows 22 above lateral line, 22 below.

Fin scales. Scales absent on dorsal, anal, pectoral, and pelvic fins. Caudal fin squamation extending to the middle of fin.

Fins. Dorsal XXII-15 (1), XXII-16 (1); anal III-11 (2). First dorsal spine about 1/4–1/5 length of last; spines increasing in length to the last, subequal from about 10<sup>th</sup>. Soft part of dorsal fin pointed, 7<sup>th</sup>–8<sup>th</sup> rays reaching slightly beyond base of caudal fin. Caudal fin rounded. Soft anal fin with acuminate tip, not reaching base of caudal fin. Pectoral fin rounded, reaching halfway to anal-fin origin. Pelvic fin inserted well posterior to vertical through pectoral-fin insertion, with acuminate tip, second ray longest, reaching about halfway to anal-fin origin or slightly beyond.



**FIGURE 1.** *Crenicichla zebrina*. Holotype MCNG 45975, 189.0 mm SL; Venezuela: Amazonas, Orinoco River drainage, lower Ventuari River in front of Cucurital fishing camp.



**FIGURE 2.** *Crenicichla zebrina*. Paratype. Lower pharyngeal tooth plate in occlusal view. ROM 82529, 264.0 mm SL. Scale bar = 5 mm.

**Teeth.** All teeth pointed, erect or slightly recurved. Teeth of outer row (25 in right hemiseries in holotype) distinctly larger than teeth of inner rows and larger anteriorly than posteriorly. Upper jaw with 5–6 inner rows of conic, slightly recurved teeth; an open space present between right and left hemiseries at symphysis; outer teeth movable, inner teeth depressible. Lower jaw with 4–5 rows of conic teeth, anterior row slightly larger, separated from inner rows by twice as much space as between inner rows, gap at symphysis, 20 in right anterior hemiseries (holotype), all teeth depressible; of variable size.

**Gills.** External rakers on first gill arch, 9 (1).

**Tooth plates.** Lower pharyngeal toothplate wide; length of bone 65% of width; dentigerous area 67% of width, 50% of length; 22 teeth in posterior row, 7–8 on median row. Anterior teeth subconical or subcylindrical, slightly laterally compressed and slightly wider at the base, recurved, conic; teeth on antero-lateral margin

progressively wider at the base towards caudal edge of plate; postero-median teeth larger, cylindrical with blunt cusps, conic (Fig. 2).

Vertebrae. 23+18 = 41 (holotype only).

**Coloration in alcohol.** Sides of head, cheek and body brown; snout and upper and lower lips gray. Brown, inverted triangle-shaped blotch below orbit, reaching about half the depth of cheek. Ventrals brown to yellow with pale vertical bars. Dark brown vertical bars on sides from middle of body to caudal fin (Fig. 1); bars reach about  $\frac{3}{4}$  of the vertical distance between the dorsal base and the anal base. Pectoral and pelvic fins pale yellow. Dorsal, anal, and caudal fins pale yellow with brown vertical bars and a brown border. Soft anal fin with dark pointed tips. Dark brown to black oval-shaped humeral spot just posterior to the pectoral fin, bisected at about  $\frac{1}{3}$  of height by upper lateral line. Ocellated black caudal spot located on second lateral bar posterior to the base of caudal fin.

**Live colors.** Live colors are described from personal observation in the field (CGM) and two photographs of live specimens taken in the field. Background color is dark brown with dark brown or gray vertical bars separated by narrower yellowish to olive bars. There are five thicker vertical bars on the sides, starting behind opercle and extending to caudal end of dorsal fin base. On caudal third of body bars are narrower, closer together and extend onto caudal fin. Between the narrow bars there are fine vertical, yellow to olive green bars. Head and lips are dark gray. Small black spot below orbit. Dorsal, anal and caudal fin with brown vertical bars as on body. Pectoral and pelvic fin without bars, uniformly yellow to olivaceous. Humeral spot black, ocellated with yellow ring.

**Distribution and habitat** (Fig. 3). *Crenicichla zebrina* is known only from the Ventuari River, the largest Venezuelan tributary of the upper Orinoco River basin. The only two known specimens were collected in rocky habitat about 1 m deep, in clear water with bedrock substrate.

**Etymology.** From the common name *zebra* for the striped African equid and the Latin feminine suffix *-ina*, referring to the zebra-like pattern of vertical dark bars in the caudal region of the body. To be regarded as an adjective in feminine form.

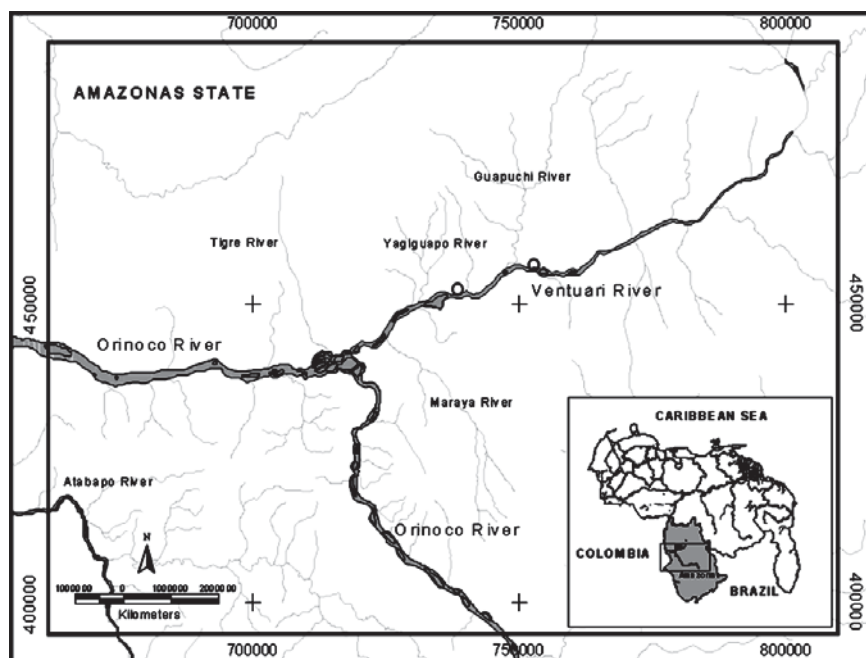


FIGURE 3. Distribution map of *Crenicichla zebrina* n. sp. lower Ventuari River, Amazonas State, Venezuela.



## Discussion

We describe a new species of *Crenicichla* from the “*acutirostris* group”, increasing the described species in the genus to seventy-nine, and the described Venezuelan species to twelve. *Crenicichla zebrina* is the first species of the *acutirostris* group recorded for the Orinoco River drainage. *Crenicichla zebrina* is so far known only from the lower Ventuari River, the largest clearwater tributary river of the upper Orinoco. Although it is expected that the species is present also in the middle and upper Ventuari River, it is unclear how far the distribution extends.

*Crenicichla zebrina* shares similar features with the small-scaled, dorsoventrally compressed, pointy-snouted *Crenicichla* species included in the putative *acutirostris* group of Kullander (1991): *C. acutirostris*, *C. jegui*, *C. multispinosa*, *C. percna*, *C. phaiospilus*, *C. ternetzi*, *C. tigrina* and *C. vittata*. Among those species, *C. zebrina* is most similar to *C. tigrina* from the Rio Trombetas basin in Brazil, but it is readily distinguished from it by the presence of a large, dark humeral spot that is absent from *C. tigrina*. Furthermore, although both species share a similar coloration pattern of alternating clear and dark vertical bars, such pattern is restricted to the caudal half of the body in *C. zebrina*, whereas it covers the entire body in *C. tigrina*. *Crenicichla zebrina* is distinguishable from all other species in the *acutirostris* group by its unique combination of dark vertical bars with thinner vertical yellowish bars between them and the high lateral scale counts. *Crenicichla acutirostris* is distinguishable by its dark vertical bands restricted to the dorsal third of the body below the base of the dorsal fin; *C. multispinosa* has numerous small white spots on the posterior third of the body, and *C. ternetzi* has a wide lateral band with no caudal spot. Adults of *C. phaiospilus* and *C. percna* are distinguished by having a dark blotch close to the superoposterior margin of the orbit and a row of blotches along sides. *Crenicichla jegui* is deeply compressed and has a row of blotches along the midline with a pronounced, caudo-ventrally directed suborbital stripe. Finally, adults of *C. vittata* have a series of dark spots at the base of the dorsal fin, a dark, lateral band from the snout to the caudal fin, and a round, ocellated caudal spot.

Due to the limited number of specimens of *C. zebrina* found, we do not show information about feeding habits and morphometric variation. Although little is known about the ecology of *Crenicichla* species, previous records on diet of large *Crenicichla* species show that they are fish and insect predators (Ploeg 1991; Kullander & Lucena 2006; Lucena 2007; Montaña & Winemiller unpubl.). Most known species of *Crenicichla* in the *acutirostris* group tend to feed on fish and crustaceans. They also prefer clear-water streams where they occupy positions near structure (e.g. hollow tree stems, rock) and exhibit sit-and-wait predatory behavior.

Results from at least five large ichthyological expeditions in the Ventuari River indicate that *C. zebrina* is either an uncommon species or it is restricted to habitats that are difficult to sample efficiently (e.g. deep waters, rapids); only two specimens have been collected so far. The Ventuari River is one of the most diverse in Venezuela, with 470 species recognized until 2006 (Montaña *et al.* 2006), and at least four new species of catfishes described between 2005 and 2007 (DoNascimento & Lundberg 2005; Werneke *et al.* 2005; Armbruster *et al.* 2007). Six *Crenicichla* species have been reported for the Ventuari River; but further taxonomic studies are needed to clarify the taxonomy of other species of *Crenicichla* that are currently unidentified. *Crenicichla zebrina* appears to be another of many endemic species observed in the upper Orinoco region (Lovejoy & de Araujo 2000), and the Ventuari River in particular (DoNascimento & Lundberg 2005). The presence of *C. zebrina* in the Ventuari River and the presence of *C. multispinosa* and *C. ternetzi* in the Guyanas may offer additional evidence of a pattern of discontinuous distribution among related taxa in the Amazonas, Orinoco, and coastal drainages of the Guyanas (Weitzman & Weitzman 1982; Lovejoy & de Araujo 2000; Provenzano *et al.* 2003). Unfortunately, the lack of phylogenetic information within *Crenicichla* currently prevents us from making meaningful interpretations of its distribution.

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